GMM Pfaudler Systems

Column Systems

GMM Pfaudler Systems

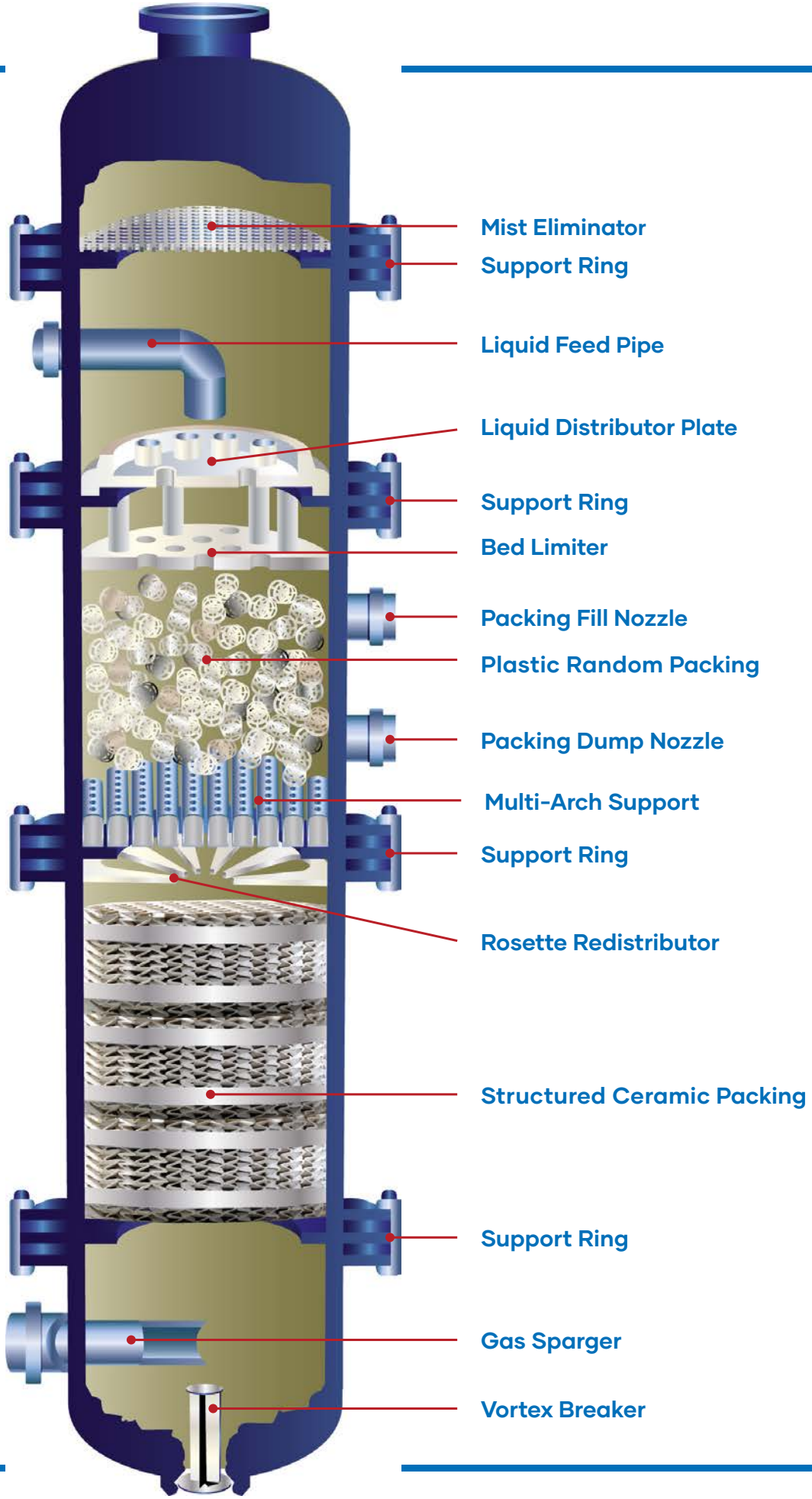
Our capabilities are not limited to the individual technologies themselves. Utilizing vast chemical processing expertise, our skilled engineers combine Technologies with all other required ancillary equipment, piping, instrumentation and controls into complete, fully integrated and efficiently operating process systems.

GMM Pfaudler supplies turn-key systems from lab scale systems through full industrial scale plants, for all chemical processes. The layout is custom designed for proper system functionality and also to ensure that all equipment, instruments and valves are arranged for ease of operation and maintenance.

This single source responsibility ensures that the design of every component is integrated into a complete system design that provides optimum system performance, reduced costs, shorter schedules and high quality construction.

PROCESS SYSTEMS PACKAGES

- Engineering & Design
- Reaction Systems
- Evaporation & Distillation Systems
- Acid Recovery
- Filtration & Drying Systems
- Absorption Systems
- Extraction Systems


Mist Eliminator
Support Ring
Liquid Feed Pipe
Liquid Distributor Plate
Support Ring
Bed Limiter
Packing Fill Nozzle
Plastic Random Packing
Packing Dump Nozzle
Multi-Arch Support
Support Ring
Rosette Redistributor
Structured Ceramic Packing
Support Ring
Gas Sparger
Vortex Breaker

Column System

Columns are used in the chemical industry for many different mass transfer processes with the required separation accomplished through countercurrent flow of liquid and vapor inside the column. Fractionation or distillation columns are used to separate various chemicals by the difference in their volatilities. Stripper, absorber and scrubber columns are used to separate and purify products, recover unreacted raw materials or valuable product from waste streams or to remove hazardous chemicals from vent and waste streams to prevent chemical emissions and to meet environmental regulations.

Pfaudler invented the technology of corrosion resistant, glass-lined steel (Glasteel®) and is the leader still today in this technology. In addition to chemical reactors and storage tanks, Pfaudler also designs and fabricates glass-lined steel columns. Our Pfaudler Edlon division has pioneered the use of fluoropolymer coatings and linings in the chemicals industry, and in addition to chemical tanks, also designs and fabricates fluoropolymer-lined columns and internals.

Our **Engineered Solutions Group**, established in the 1950's, has a team of chemical process engineers dedicated to the design of distillation, fractionation, scrubber, and absorber columns for corrosive applications.

Pfaudler combines its pressure vessel, corrosion resistance and column internals Technologies with our mass transfer engineering knowledge, expertise and experience to design complete column systems with single-source responsibility for any corrosive, ultra-clean or ultra-pure chemical process.

Adsorber

Scrubber

Stripper

Distillation

Fractionation

Rectification

Corrosion Resistance

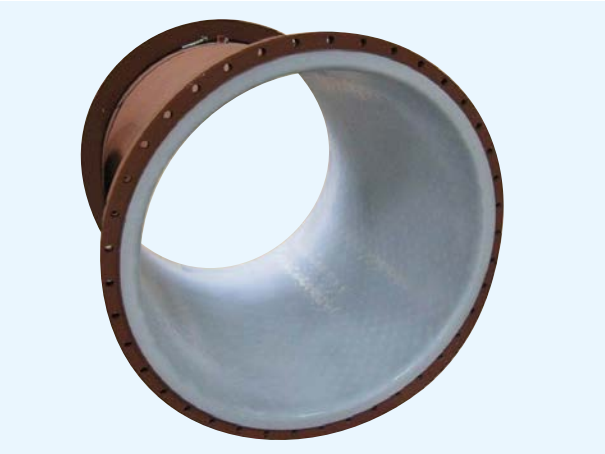
For corrosive and high-purity column applications we utilize our **Pfaudler Glasteel®** and **Edlon fluoropolymer** technologies for the column shells and our **Pfaudler reactive metal** technologies for the reboilers and condensers.

The selection, design and manufacture of the proper high performance corrosion resistant materials of construction is critical for the safe production and storage of corrosive and hazardous chemicals. Material selection is also critical for ultra-pure chemical applications to prevent contamination. Pfaudler has many years of experience and expertise with corrosion resistance, ultra-clean, and ultra-pure material processing as we invented Glasteel® in 1884, pioneered the use of fluoropolymer technologies for process applications with our Edlon division in 1964 and were the first to fabricate process equipment from Zirconium in 1938 and Tantalum in 1946.

Pfaudler has the largest number of customer installations of glass-lined and fluoropolymer-lined equipment for corrosive applications in the Chemicals Industry, ultra-clean applications in the Pharmaceutical Industry and ultra-pure applications in the Semi-Conductor industries.

We have a wide range of glass linings for our clients' corrosive and ultra-clean process requirements. To name a few, our standard WWG, has the widest range of applications, our Pharma Glass is ideal for ultra-clean applications, Poly Glass has anti-stick properties ideal for polymer applications, ARG provides increased abrasion resistance and ASG has anti-static properties.

Our knowledge and expertise of the unique properties of fluoropolymers combined with our Edlon brand technologies enables us to meet the most complex geometric challenges for column internals and packing. Depending on the application, our column linings, coatings and internals are manufactured utilizing fluoropolymers such as PTFE, PFA, ECTFE, ETFE and PVDF.



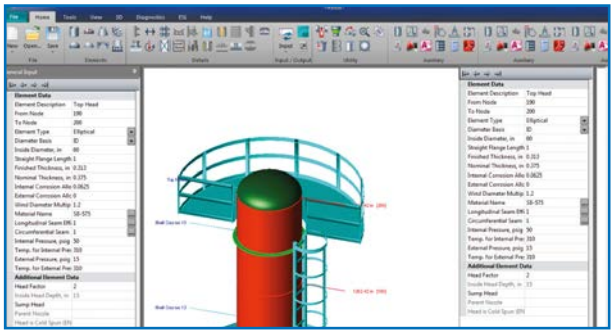
Pressure Vessel Design

Pfaudler has fabrication facilities located in different countries to serve our global clientele and we design equipment per all major global pressure vessel design codes including: **ASME**, **DIN**, **PED, TUV**, **GB150, Chinese Certification "SELO"**, **AD Merkblatter 2000**, **KGS**, **TEMA**.

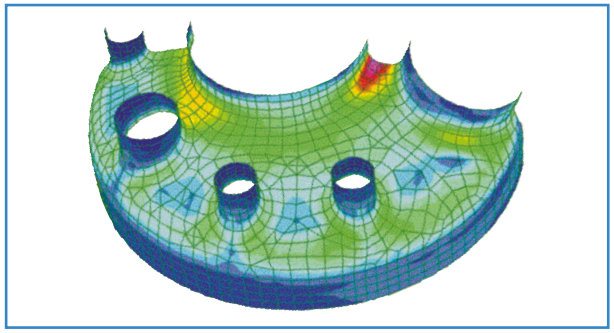
We size, design and 3D model pressure vessels utilizing internationally recognized software programs such as PVElite, Aspentech, HTRI, Solidworks, and Autodesk AutoCAD.

We fabricate column systems from 80-2200 mm (3-86 in) in diameter and up 27.500 mm (90 ft) high with design temperatures up to 343°C (650°F) and design pressures of full vacuum up to 20 bar (300 psig).

Depending on the column application, the pressure vessel shell is manufactured with any one of our glass-lining formulations or with fluoropolymer loose lining, bonded lining or coating.



Computational Fluid Dynamic (CFD) and Finite Element Analysis (FEA) are completed for critical applications.



Internals

Ladder Distributor

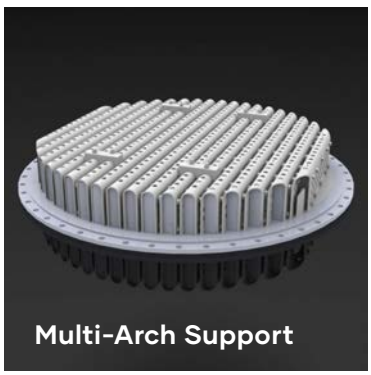
Flangeless Internals Support
Pfaudler's innovative internal support design eliminates the need for additional body flanges in large diameter columns which greatly reduces the area of gasketed surface in our corrosion resistant columns which greatly reduces leak potential.

Bubble Cap Tray

Liquid distributors and redistributors provide even distribution of the liquid flow in a packed column, which is critical in a separation process to ensure good liquid/vapor contact. Different types of distributors we provide include orifice riser, trough, Rosette and ladder. These distributors are typically supported on glass-lined, PFA-lined or exotic metal support rings.

Trough Distributor

Packing supports plates for corrosion resistant columns are typically ceramic or PTFE due to lower cost or can be exotic metal where higher temperatures are required. Weight of the packing is also a critical issue when choosing the material of construction. These plates are also typically supported on glass-lined, PFA-lined or exotic metal support rings.



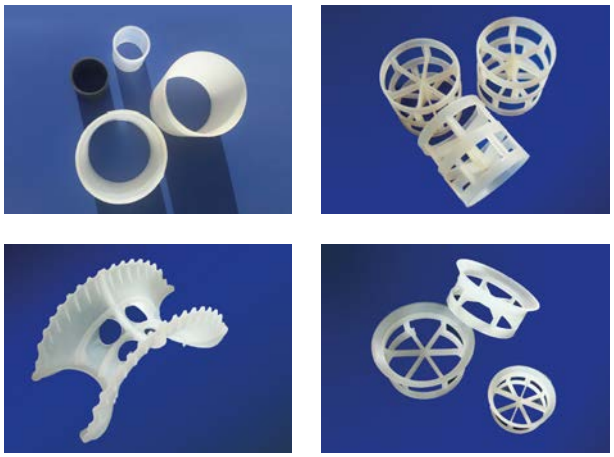
Multi-Arch Support

Packing

Mass transfer media provides the surface area necessary for intimate liquid-vapor contact in a column to ensure the proper separation.

Pfaudler provides all types of mass transfer media: random packing, structured packing and trays.
Random packing and structured packing are most typical for corrosion resistant column applications as they can be manufactured with lower cost materials such as ceramic and fluoropolymers compared to higher cost corrosion resistant alloys.

Ceramic Random Packing



Plastic Random Packing

Ceramic Structured Packing

Packing Type	Wet-ability	HETP	Weight	Press Drop	Temp Limit	Cost
Structured Exotic Metals	Moderate	Very Low	Moderate	Low	Very High	Very High
Random Ceramic	Good	Moderate	High	Moderate	High	Very Low
Structured Ceramic	Good	Moderate	High	Moderate	High	High
Random Plastic	Low	Moderate	Very Low	Low	Low	Moderate

Pfaudler selects the optimum packing for our corrosion resistant columns taking into consideration materials of construction, wet-ability, height of theoretical plate (HETP), pressure drop, temperature limit and cost.

The end result is an efficient design that provides the highest throughput and best separation with the lowest operating and capital costs.

Process Engineering

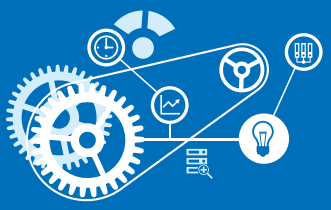
Our Engineered Solutions Group is comprised of experienced engineers, representing all disciplines of turnkey plant design.

At the heart of this group are chemical engineers, with vast experience and expertise in all chemical operations, including: Evaporation, Distillation, Mass Transfer, Reaction, Mixing, Heat Transfer, Filtration, Fluid Flow, Drying, and more.

Our experts completes column process designs utilizing process simulations with Aspen Hysys® and/or by processing our clients materials in our Pilot Process Test Facility.

Using the simulation output and/or pilot test data, Pfaudler's engineering team develops an optimized column design for an efficient, safe, and economical commercial production facility.

This complete design takes into account column size, throughput, column hydraulics, pressure drop, packing properties, heating and cooling demands, and corrosion parameters affecting material selection.



OPTIMIZATION

INCREASE
YIELD

Pilot Testing

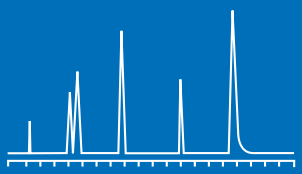
Before chemical production begins, or construction starts, and before engineers design the facility, an optimal chemical process must be developed, and proven. At Pfaudler's world-class Process Test Facility, our experienced chemical process engineers develop & optimize your process, and collect the data required to design your commercial-scale facility.

Typical purposes for testing at Pfaudler's Process Test Facility include new process development, yield and purity improvement, process optimization for cost-reduction and increased profit, and VOC reduction to meet environmental regulations.

Pfaudler's Process Test Facility, can be configured for a variety of evaporation operations. Multiple utility systems provide a wide range of operating conditions, including: a high-capacity multi-stage vacuum system, for vacuum down to less than 0.01 millibar, hot thermal oil up to 345°C, steam to 180°C and water systems from -12° to 140°C.

Our Process Test Facility is designed to process flammable and corrosive chemicals, in volumes ranging from lab samples, to IBC(Intermediate Bulk Containers) tank quantities.

Pilot testing concludes with a comprehensive report that includes the scope, objectives, and sample analytical results, accompanied by conclusions, and recommendations.



ANALYTICAL
DATA

PROCESS
ENGINEERING

Complete Process System Design

Our experts designs, fabricates and commissions complete process systems with Pfaudler's Acid Concentration Technology at the core.

These complete systems include the acid concentrator/evaporator plus all ancillary equipment, instrumentation and piping completely assembled on structural steel modules or field fabricated.
Each system is designed specifically for our clients' process. The layout is custom designed to ensure proper system functionality and to ensure all equipment, instruments and valves are arranged for ease of operation and maintenance.

This single source responsibility ensures the design of every component is integrated into a complete system design to ensure proper system performance.

Our modular design provides:
- Reduced costs
- Shorter schedule
- High quality construction

MODULAR
CONSTRUCTION

HIGH QUALITY
COMPONENTS

SINGLE SOURCE
RESPONSABILITY

Worldwide Presence

GMM Pfaudler

GMM Pfaudler is a global leader in corrosion-resistant technologies, systems, and services for the chemical, pharmaceutical, food and energy industry.

Our Branded Product Lines that include PFAUDLER, NORMAG, MAVAG, MIXION, INTERSEAL, EQUILLOY, EDLON and HYDROAIR showcase our strength as a group, our capabilities, and our pursuit for constant innovation. With an end-to-end solutions-oriented approach, a global footprint, and a perfectly integrated offering system we are able to meet complex industry demands worldwide.

GMM Pfaudler is driven by 1800+ individuals across 4 continents and 15 global manufacturing facilities around the world. The Group's targeted investments in strategic markets, innovation and competitiveness paves the way forward for GMM Pfaudler's continued legacy.

80+
Countries

1800+
Employees

04
Continents

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Manufacturing Facilities Sales & Services Organization

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